

alternated presentations of papers by the two zoologists. However, Geoffroy refused to restrict the discussions to Cuvier's agenda and widened the scope by including broader issues, among them final causes, facts versus theories, and evolution. The debate came to a close at the 5 April meeting when Geoffroy announced that he would no more reply: the polemics in his opinion did not clarify the issues and were becoming acrimonious.

While Cuvier has been generally recognized as having had the upper hand, Appel shows that no one really won the contest and that French naturalists in the 1830s and 1840s "reached an extraordinary degree of unanimity" and integrated both approaches in their zoological theorizing.

While Geoffroy more and more estranged himself from the professional community of scientists by his grandiose theorizing (he fancied himself as a natural philosopher completing Newton's synthesis and dabbled in physics) and by his direct appeals to the public, where he found substantial support, the debate soon took many guises and became a romanticized historical event laden with polymorphic significances, carefully chronicled and analyzed in the last chapters of the book.

Appel's is a much richer monograph than I have been able to convey here. It is the most thorough analysis we have of the controversy at issue; it will also no doubt become a required reading for historians of French biology in the first half of the last century, as well as for sociologists interested in unraveling the intricacies of scientific controversies.

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Dualisms

Medicine, Mind, and the Double Brain. A Study in Nineteenth-Century Thought. ANNE HARRINGTON. Princeton University Press, Princeton, NJ, 1987. xiv, 336 pp., illus. \$39.50.

Brain function was one of the most important, yet one of the most murky, aspects of science in the 19th century. Exact measurements, ingenious behavioral tests, and innovative theorizing coexisted with crude vivisections, uncontrolled speculations, and violent arguments. Scholars are only beginning to understand the range of issues at stake. This book opens up one part of the history of brain physiology, namely, ideas

concerning the cerebrum's dual nature. Like the early localization experiments, the book generates suggestive results; but also like those studies, it leaves the reader uncertain about the meaning of a seemingly rather arbitrary cut through a complex web of intellectual activity.

For two centuries following Descartes, physicians and philosophers agreed that the brain was a single, symmetrical organ. A few English medical writers, most notably Arthur Wigan in 1844, speculated that the two hemispheres were not functionally identical. But real interest in the subject only began in 1861, when the French pathologist Paul Broca argued that articulate speech could be localized in the third frontal convolution of the left hemisphere. Harrington describes the scientific context for Broca's work on aphasia, explains the broad implications he drew from it, and demonstrates his extensive influence on French neurology for the rest of the century. Broca, J.-M. Charcot, and their followers, seeking to demonstrate important functional differences between the two halves of the brain, blended sophisticated neuropathological tests with credulous descriptions of hysterics, hypnotics, and subjects supposedly under the unilateral sympathetic influence of metal disks. They believed that the tension between a rational left and an emotional right hemisphere could explain not only aphasia, hemiplegia, and double personality but also sex and race differences, religious enthusiasm, and supposed occult phenomena. Harrington is very effective in conveying the power of the double-brain concept in generating an amazingly varied range of "facts."

Enthusiasm for brain duality was localized in both time and place. Although the English neurologist John Hughlings Jackson relied on the concept for his complex theory of brain function and Freud drew on Jackson's insights in developing the psychoanalytic concept of repression, influence outside France was largely private and idiosyncratic. Furthermore, the subject all but disappeared from scientific awareness after 1920, as psychiatrists turned to psychological explanations and neurologists emphasized holistic brain dynamics. The scientific community that developed in the 1960s out of Roger Sperry's split brain experiments essentially rediscovered brain duality. This book is written largely for that audience, both to inform them about the tradition to which they belong and to caution them about the extent to which their field has been susceptible to "easy generalizations, philosophical pitfalls, and influences from extrascientific quarters" (p. 5).

Although Harrington persuasively describes the extent and peculiar nature of

19th-century work on the double brain, she is less successful in conveying the structure of scientific activity and its historical significance. Because she jumps rapidly between individuals and situations, extracting ideas relevant to brain duality, she neglects to explain how those ideas fit within the broader framework of physiological and neuropathological investigation. A more significant problem is her isolation of brain science from other intellectual concerns. She explains that scientific interest in the double brain arose from concern about the seat of the soul but ignores the extent to which the theory was and remained—in the words of one opponent—"a kind of psychological Manichaeism" (p. 151). Double-brain theory was one manifestation of the belief, central from Mani and St. Paul through Calvin and Jerry Falwell, that conflict between good and evil is inherent in human nature. Harrington reports without comment that Broca came from the small French Calvinist community; similarly, she notes in passing that Blaise Pascal, famous both as a scientist and as a fervent Calvinist, was described more than a century before Broca as lucid about events in the right half of his visual field but having a mad fear of "the abyss" on his left.

This is not to say Harrington ignores "extrascientific" influences. But she sees them as a separate sphere, introduced only when the properly scientific narrative reaches a dead end. As a result of this dualism, she misses what seems to me the most striking factor in the late-19th-century French obsession with brain duality. In Germany, united for the first time under the Prussian bureaucracy, most scientists described the brain as a set of functionally distinct departments; English medical writers, confronted with the psychiatric consequences of a class-based society, worried how the rational cortex could control lower, more primitive elements of the central nervous system. It was only in France, especially in the uncertain early years of the Third Republic, that anti-Catholic liberal scientists were determined to show that civilization and rationality resided necessarily on the Left, while decadence and mysticism were on the Right. Given the structure of language and the power of social interests, articulation of basic issues about human nature has always involved the blending of scientific and extrascientific concerns; the unresolved problem is to understand how particular sets of concerns have generated differently valued forms of science.

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